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AUTHOR Collins, Terence
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ABSTRACT

This report brings together data from three cycles of replication and serves as a summary of the findings of the Learning Disabled College Writers Project at University of Minnesota-General College. From July 1985 through September 1988, teachers and researchers examined the impact of microcomputer word processing on the classroom performance of learning disabled students enrolled in mainstream required freshman writing courses. Data were eventually gathered from 18 separate sections enrolling 57 subjects taught by 8 different teachers over a 3-year period. Learning disabled (LD) students were compared to non-LD students on the basis of course completion rates, course grades, change in writing apprehension, and writing fluency. Results indicated that: (1) course grade and course completion differences were minimal; (2) attitude toward writing was affected very positively among the LD group and not nearly so much among the non-LD group; and (3) fluency was improved among the LD group but did not rise to levels achieved by the non-LD group. The report concludes that the microcomputer offers some promise as an accommodation of the difficulties of some learning disabled student writers and brings the task of writing into the realm of the possible for a population facing severe disadvantages and frequent failure. (Fifteen charts and graphs are included; 17 references and a list of 15 publications arising from the project are attached.) (RS)

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A Summary of the Learning Disabled College Writers Project at the University of Minnesota-General College

Terence Collins
University of Minnesota
General College
246 Appleby Hall
128 Pleasant Street SE
Minneapolis, MN 55455

Conference on College Composition and Communication
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CS 211 675

The Learning Disabled College Writers Project at the University of Minnesota-General College

The Learning Disabled College Writers Project was a U.S. Department of Education, Office of Special Education and Rehabilitation Services-Postsecondary Programs for the Handicapped Demonstration Project. From July, 1985 through September, 1988, teachers and researchers at the University of Minnesota-General College examined the impact of "off-the-shelf" microcomputer word processing on the classroom performance of learning disabled students enrolled in mainstream required freshman writing courses. A total of 53 learning disabled writers were studied and followed during their enrollment in the two-quarter, twenty-week writing sequence. The writing courses studied were taught in sections which

* were taught in a micro-computer equipped writing classroom
* were taught by regular faculty and graduate teaching assistants with no special training in learning disabilities
* enrolled both previously diagnosed learning disabled students and non-LD students in a ratio of not more than 1 : 2.25
* provided no extraordinary supports for the LD students.

The key questions were these::

* In the microcomputer classroom, would LD students persist at rates comparable to those of the non-LD students?
* Would LD students earn comparable grades?
* Would LD students show improved attitude toward writing?
* Would LD students show comparable gains in fluency and control of their writing?

Preliminary data and description of the work have been reported at this conference in previous years and in a number of journal articles (see attached list). This presentation brings together data from the three cycles of replication and serves as a summary of findings.

Rationale

Before the findings are presented, a brief rationale for the study seems useful. Recently, interest in learning disabled college students and effective intervention strategies have increased (Adelman and Taylor, 1986; Buchanan and Wolf, 1986). The number of LD students seeking a postsecondary education is on the rise, with estimates ranging from 5 to 15% of the college population being learning disabled (Hinds, 1985; Cohen and Schwartz, 1983). Mainstreaming and "least restrictive environments" have become the norm in the lower schools. With a concomitant rise in expectations among students now moving into higher education, and a clear legal obligation to accommodate documented disabilities in our programs, those who teach in and administer writing programs have an interest in finding ways to

meet the challenge of this special population (Longo, 1988; Collins, Engen-Wedin, and Margolis, 1988).

College writing researchers and teachers have addressed the needs of the LD population. In a 1985 article in Journal of Basic Writing, Amy Richards describes characteristics of LD students' writing, noting special problems with spelling, punctuation, clarity, and graphic presentation which might separate the LD population from the more familiar "basic writer" group (Richards, 1985). Others have noted that LD students' low self-esteem, difficulties with socialization, fear of failure, and general unresponsiveness to remediation strategies present the writing teacher with problems which go beyond those presented by basic writers (Buchanan and Wolf, 1986; Gregg, 1983; Alley, et al, 1983; Longo, 1988).

Several studies indicate positive outcomes for LD writers who use word processing. The studies note improved surface features of texts, increased motivation for writing, decreased apprehension toward writing, improved self-concept as a writer, and general academic improvement (Collins and Price, 1986; Kolich, 1985; Kerchner and Kistinger, 1984; Hummel, 1985; Griffey, 1986). Jay Brill, editor of the HEATH Resource Center newsletter and a self-described "total disgraphic" refers to word processing as "liberation technology." Less effusively, Arkin and Gallagher (1984) observe that for some LD writers, the microcomputer/word processor serves as a "by-pass" strategy which serves to accommodate the writing difficulties of some learning

disabled persons.

These studies, however, have generally relied on testimonial evidence or very limited subject numbers. Our study took seriously the promise evidenced by the testimonials and sought to test that promise with a more empirical approach.

Method

The legislation regarding accommodation of disabled persons focusses on equal opportunity to take part in and succeed in programs of higher education (usually cited under sections 503 and 504 of the 1981 amendments to the Rehabilitation Act of 1973). Our goal, then, was to test whether writing courses using microcomputers provided a reasonable, effective, and economical way to help learning disabled students achieve in required gatepost courses and, not incidentally, to become better, more independent writers. Since the problem had been presented to us in terms of high failure rates among LD students in the freshman writing course, high withdrawal rates, large numbers of multiple registrations in attempting to pass the course, increased incidence of plagiarism in meeting requirements, and the like, we sought to measure "success" in terms of the intervention's providing opportunity for progress through the gatepost of the required courses, toward the goal of a degree.

Thus, we measured success by comparing the LD and non-LD students on the basis of

* course completion rates
* course grades

* change in apprehension as measured by the Daly-Miller Scale of Writing Apprehension

* fluency as measured by amount of writing produced in a timed setting, holistic scores on timed writing, and spelling.

The criteria were determined in consultation with learning disabilities specialists who helped define the problem areas. Each cycle of registration and tracking included students in three separate sections of each of the two courses, and the cycle of registration and tracking of results was repeated in three successive years to minimize specific effects from particular teachers. Thus, the results reflect eighteen separate sections enrolling a total of 57 subjects, with eight different teachers over three years.

Results

I'll summarize the results in tabular form. As preliminary remarks, I would note that the year-to-year variation in outcomes is remarkably small. Data are being reorganized and re-run to test for p-values in year-to-year variation, but as you'll see, from a common-sense reading of the data it is clear that annual results hold up in all three replications. This strongly suggests that the outcomes are independent of individual instructor styles, time of day, quarter of registration, and other such variables. It is also worth noting that the classroom was equipped with Apple IIe, Macintosh, and MS/DOS based Zenith 159 and IBM computers, with no apparent variation in outcomes by

machine type or software.

In addition to the quantitative data to be presented here, we have conducted interviews with all LD and selected non-LD subjects. In the interviews, some remarkable testimonial information surfaces. In nearly every case, the LD students attribute new ways of "seeing their thinking" and "seeing their words." They attribute powerful changes to the technology. The results would lead us to concur.

1. Course completion rates

One of our primary concerns was a widely observed high incidence of failure, withdrawal, and multiple attempts among LD students in required freshman writing courses. On our own campus, it was not uncommon for some otherwise-successful LD students to attempt the freshman writing course four or five times. One of the LD students, a junior at the time she enrolled in (and completed!) one of our sections, had attempted and withdrawn eight times -- once each quarter of enrollment.

Given the vagaries of life in a metropolitan commuter university, we set our "success" test to be comparability with the completion rates achieved in the course by non-LD students. Student personnel professionals had advised us that retention rates vary as a function of a number of factors ranging from teacher characteristics to time of year to shifts in financial aid formulas (and therefore to number of work hours required of students). We assumed that the LD group would be affected by these extrinsic factors about as much as would the non-LD group.

As the first slide indicates, the two groups did achieve course completion at remarkably similar rates in all three years.

[Here display "Course Persistence, Years 1-3, LD CWP"]

There is an unexplained dip in the overall completion rate in the second course in years two and three, but the two groups "dipped" in parallel.

2. Grades

Course grades were tested on two criteria: 1. comparability of LD and non-LD groups (that is, in this environment, would the LD group "act like" the non-LD group in those areas of performance which add up to a grade?) and 2. acceptability (would the LD group earn grades in the gatepost required course adequate for matriculation?).

On criterion one, the answer would appear to be "not quite." When the grades of the two groups are compared, each year's results shows some differences (without statistical significance -- but that is a shaky criterion given the relatively low N in any given term) in grades between the two groups. Counterintuitively, the difference is twice in favor of the LD group.

[Here display in succession, overlapping if possible, slides "Group Comparison for Year One (1985-86), Course Grades"; "LD and NLD Group Comparison for 1421 and 1422 Course Grades, 1987"; and

"Group Comparison for Year Three (1987-88), Course Grades"]

A common sense reading of the numbers is that members of both groups who completed the course did quite well in terms of grades, and there is common sense comparability. On the second criterion, that of acceptability for matriculation, the average grade among those who complete the course in the LD group is consistently high enough for mobility among programs in the university.

[Here display slide "Grades earned by LD and NLD Groups in 1421 and 1422 Writing Courses."]

The gatepost has been passed.

3. Apprehension

The testimonial literature contains a number of descriptions of high writing apprehension and writing blocks among the LD population. This is not surprising. LD students frequently have tremendous difficulty in writing. In some cases, they are sent to special classrooms -- "resource rooms" -- in the early grades, gaining some in skills development at the price of some stigmatization. In other instances, they fail repeatedly or, at best, notice the real differences between their own writing and that of their peers in mainstreamed classrooms. Our interviews surfaced an alarming incidence of plagiarism (both of the usual type and, surprisingly, a large amount of direct involvement of

parents). Fear of writing is a common feature of the LD student's predicament, and an understandable one.

We naturally wanted to test whether the microcomputer sections of writing courses produced changes in this apprehension. It did, positively and significantly, and did so consistently across replication cycles.

[Here display slides "Group Comparison for Year One (1985-86, Daly-Miller Scale of Writing Apprehension"; "Change Scores for Year 1 (1985-86), Daly-Miller Scale"; "LD and NLD Group Comparison for Daly-Miller Writing Apprehension Inventory, 1987"; "Pre, Post, Change Scores for Daly-Miller Writing Apprehension Inventory, LD and NLD, 1987"; "Group Comparisons for Year Three (1987-88) LDCWP, Daly-Miller Scale"; Change Scores for Year 3 (1987 -88), LDCWP, Daly-Miller Scale"; "Pre and Post Daly-Miller Writing Apprehension Scores for LD and NLD Students"]

It is worth noting that at the beginning of the first course, there is a consistent and statistically significant difference in apprehension levels, with the LD group more highly apprehensive. By the end of the second course, the difference is reduced and is not statistically significant. It is worth noting that the "change scores" show a more marked reduction in apprehension for the LD group than for the non-LD group. In view of the grades and course completion rates, there is something of a "chicken and egg" problem here: it makes sense that one's apprehension toward

a task is reduced when one knows one has a likelihood of succeeding; one succeeds when one's apprehension is within productive limits. Most likely, the two phenomena interact.

The interviews are consistent in reinforcing what is suggested by the numbers: the LD group reported fairly regular and frequently dramatic changes in attitude. All fifty-seven LD subjects alluded to reduced anxiety or fear or apprehension or blocking with only the vague prompting of "how do you feel about your writing now?"

4. Fluency

Fluency is a difficult thing to measure. We approached it through a pre-, mid-, and post- writing sample gathered in week 1, week 10, and week 20. The sample was produced by both the LD and non-LD students in two one-hour sittings in successive class periods (the teacher held the drafts between sittings). Students were given the option of using the word processor or not and were advised that performance would be considered in grading for the course. The samples were evaluated in three ways:

1. blind scoring on a 6-point holistic scale (inter-rater reliability over the three years varied from .88 to .93)
2. number of words produced
3. spelling

The three approaches gave us a sense of overall quality, quantity, and control in at least one key area of difficulty for LD writers.

[Here display slides "Group Comparisons for Holistically Rated Writing Samples"; "Total Number of Words Produced in Writing Samples"; "Proportion of Words Misspelled in Writing Samples"]

On the question of writing quality, holistic scores tend to be divergent at the outset with a narrowing of the gap over time. There is not a consistent pattern to this over the three replications cycles. Most noteworthy, perhaps, is the first year's statistically significant gap in score at all three sessions. In years two and three, a statistically significant difference at pre- gives way to a non-significant difference at end. Overall, though, on timed prompts the LD group performed less well than did the non-LD group at pre-, mid-, and post-, with both groups showing some improvement over time.

When total number of words is the measure, the pattern is similar. The non-LD group tended to produce more writing in the same timed session, although both groups increased in productivity over time.

When spelling is the measure, the non-LD group again performs differently than does the LD group. The LD group does approach the performance of the non-LD group at times, but at every measuring point the LD group misspells more frequently than does the non-LD group. The difference is often statistically significant.

Summary

Simple descriptive statistics tell us something about the efficacy of the word processor in this study. When success is defined as helping a group of variously learning disabled student writers perform like non-learning disabled student writers without the intervention of specialists, it would appear that success is approached but not achieved. On essential matriculation criteria (grades and course completion) the differences are minimal. Attitude, at least as it is measured by the Daly-Miller Scale, seems to be affected remarkably and positively among the LD group and not nearly so much among the non-LD group. Fluency is improved among the LD group, but does not rise to levels achieved by the non-LD student cohort.

The microcomputer, then, offers some promise as an accommodation of the difficulties of some learning disabled student writers. In some ways, it does function as an equalizer, bringing the task into the realm of the possible for a population facing severe disadvantages and frequent failure. As such, it helps us as writing teachers do our job with a most challenging population.

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LD COLLEGE WRITERS PROJECT - PUBLICATIONS

The following publications were produced by the LD College Writers Project. All are or will be available through the ERIC Clearinghouse and accessed by name, Terence Collins.

Engen-Wedin, N., & Collins, T. Composition, Word Processing, and the Learning Disabled College Writer: An Annotated Bibliography (68 pages), ED 267 410.

Engen-Wedin, N., Collins, T., & Lawson, J. Supplement to Annotated Bibliography (17 pages).

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Engen-Wedin, N., & Dunford, M. Composition, Word Processing, and the Learning Disabled College Writer: An Annotated Bibliography, revised and compiled, September, 1988.

Collins, T., & Price, L. Testimony from Learning Disabled College Writers on the Efficacy of word Processing in their Writing Process: Working Paper (32 pages), ED 267 411.

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Course Persistence, Years 1-3, LD College Writers Project

1985-1986

	Course 1 (1421)	Course 2 (1422)
LD (n=20)	.95	.89
NLD (n=52)	.96	.95
Other sections (n=50)	.85	.88

1986-1987

	Course 1 (1421)	Course 2 (1422)
LD (n=18)	.94	.59
NLD (n=55)	.87	.55

1987-1988

	Course 1 (1421)	Course 2 (1422)
LD (n=19)	.95	.58
NLD (n=55)	.93	.65

Group Comparisons for Year One (1985-86)
Learning Disabled College Writers Project

Course Grades

Group	1421	1422
LD	$\bar{x}$= 3.05 SD= .44 n = 16	$\bar{x}$= 2.86 SD= .61 n = 14
NLD	$\bar{x}$= 3.23 SD= .55 n = 39	$\bar{x}$= 3.05 SD= .94 n = 37
Significance	p= .204	p= .472

p values obtained using group t-tests

LD and NLD Group Comparison for 1421 and 1422 Course Grades, 1987 (group t-test)

	1421	1422
LD	X=2.89 SD=1.22 n=18	X=3.36 SD=.47 n=10
NLD	X=3.15 SD=.66 n=44	X=2.91 SD=.78 n=30
	p=.394	*p=.036

Group Comparisons for Year Three (1987-88)
Learning Disabled College Writers Project

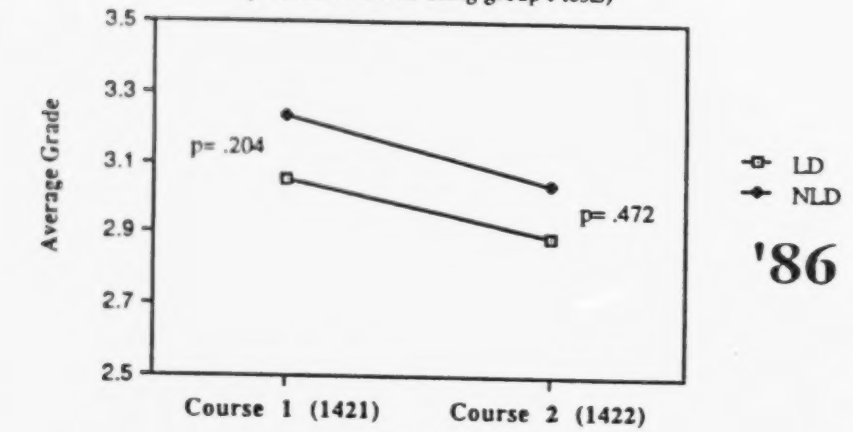
Course Grades

Group	1421	1422
LD	$\bar{x}$= 2.76 SD=1.02 n= 18	$\bar{x}$= 3.05 SD= .55 n= 11
NLD	$\bar{x}$= 3.04 SD=1.03 n= 51	$\bar{x}$= 2.83 SD=1.11 n= 36
Significance	p= .325	p= .377

p values obtained using group t-tests

Grades Earned by LD and NLD Groups in 1421 and 1422 Writing Courses

(p-values obtained using group t-tests)



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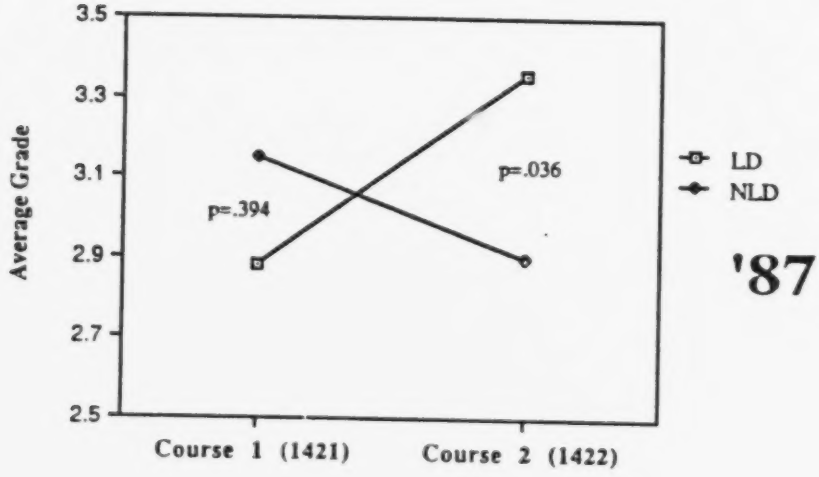

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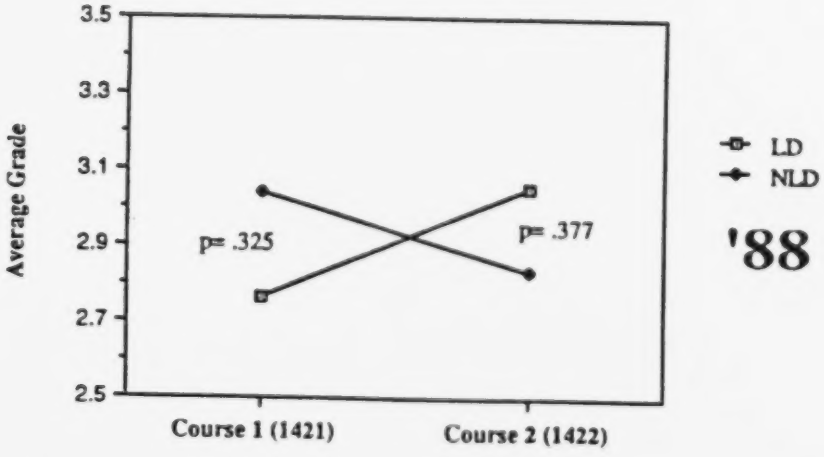

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Group Comparisons for Year One (1985-86)
Learning Disabled College Writers Project

Daly-Miller Scale of Writing Apprehension

Group	Pre	Post
LD	$\bar{x}$= 80.00 SD=15.78 n = 17	$\bar{x}$= 65.60 SD=16.86 n = 15
NLD	$\bar{x}$= 63.51 SD=14.79 n = 39	$\bar{x}$= 60.31 SD=16.70 n = 35
Significance	p= .001*	p= .318

p values obtained using group t-tests

Change Scores for Year 1 (1985-86)
Learning Disabled College Writers Project

Daly-Miller Scale of Writing Apprehension

Group	Pre	Post	Significance
LD	$\bar{x}$ = 78.33 SD=16.05	$\bar{x}$ = 65.60 SD= 16.86	p = .001* n = 15
NLD	$\bar{x}$ = 63.06 SD=14.91	$\bar{x}$ = 60.31 SD= 16.70	p = .321 n = 35

p values obtained using paired t-tests

LD and NLD Group Comparison for Daly-Miller Writing Apprehension Inventory, 1987 (group t-test)

	Pre	Post
LD	X=82.24 SD=16.60 n=17	X=69.20 SD=19.12 n=10
NLD	X=70.30 SD=16.03 n=44	X=63.61 SD=17.64 n=28
	*p=.017	p=.431

Pre, Post Change Scores for Daly-Miller Writing Apprehension Inventory, LD and NLD, 1987 (paired t-test)

	Pre	Post	
LD n=10	X=74.6 SD=13.51	X=69.2 SD=19.12	p=.442
NLD n=27	X=68.93 SD=16.60	X=62.96 SD=17.62	p=.157

Group Comparisons for Year Three (1987-88)
Learning Disabled College Writers Project

Daly-Miller Scale of Writing Apprehension

Group	Pre	Post
LD	$\bar{x}$= 81.11 SD=18.62 n= 19	$\bar{x}$= 68.00 SD=17.35 n= 13
NLD	$\bar{x}$= 64.82 SD=15.86 n= 55	$\bar{x}$= 58.15 SD=16.55 n= 33
Significance	p= .002	p= .094

p values obtained using group t-tests

Change Scores for Year 3 (1987-88)
Learning Disabled College Writers Project

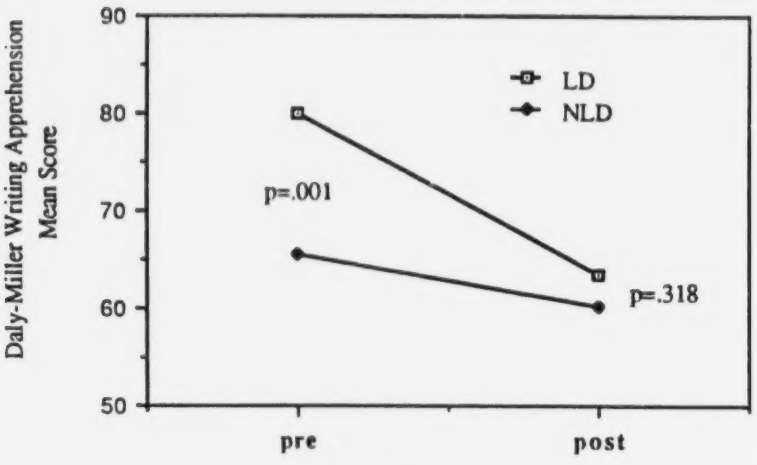
Daly-Miller Scale of Writing Apprehension

Group	Pre	Post	Significance
LD	$\bar{x}$ = 81.08 SD=16.99	$\bar{x}$ = 68.00 SD= 17.35	p = .019 n = 13
NLD	$\bar{x}$ = 64.18 SD=15. 99	$\bar{x}$ = 58.15 SD= 16.55	p = .025 n = 33

p values obtained using paired t-tests

Pre and Post Daly-Miller Writing Apprehension Scores for LD and NLD Students

(p-values obtained using group t-test)



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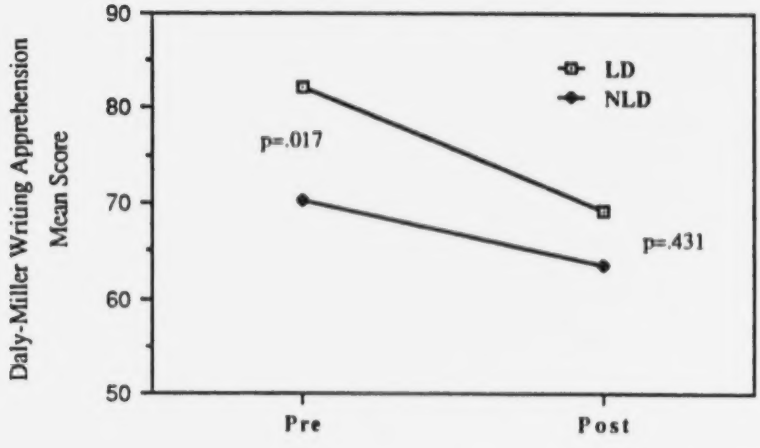

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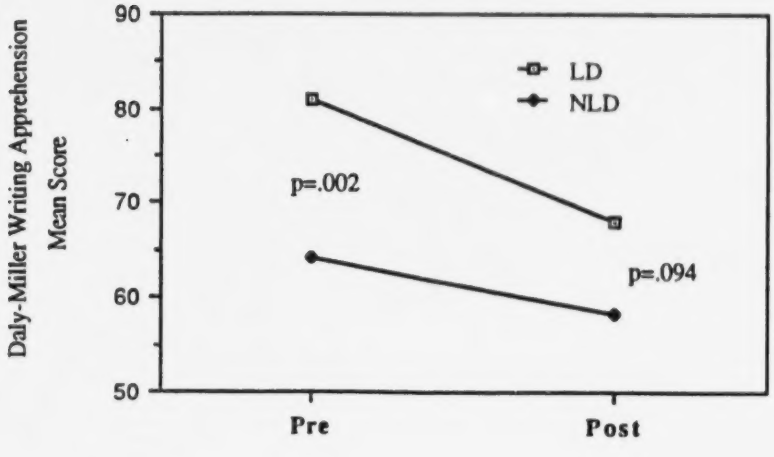

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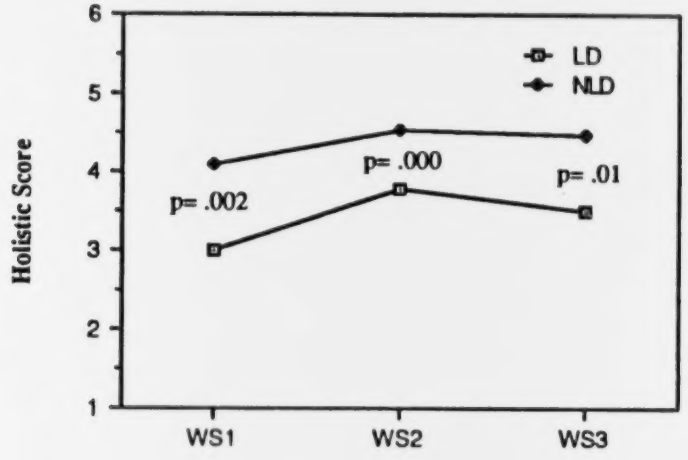
Group Comparisons for Holistically Rated Writing Samples: 1985-1988



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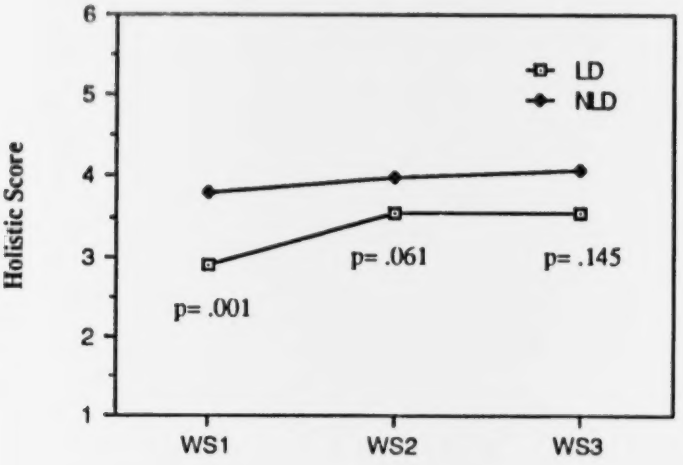

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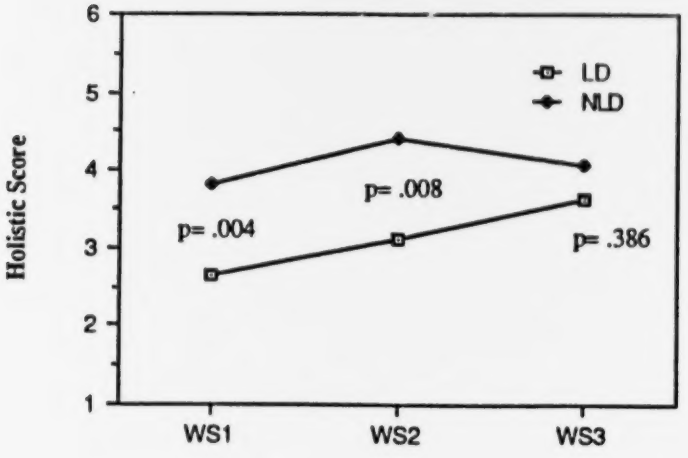

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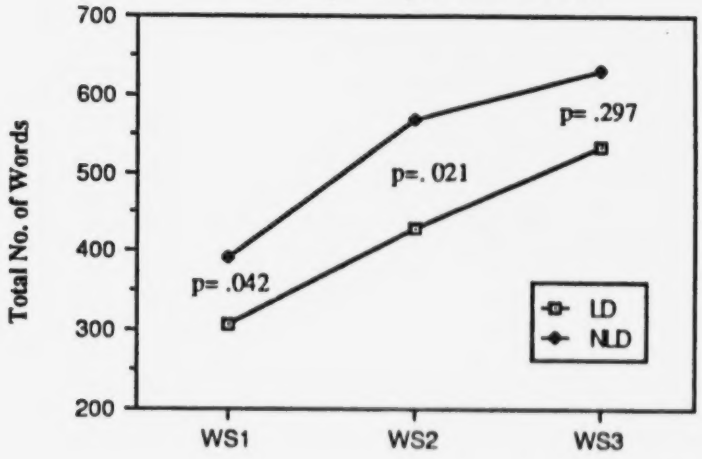
Total Number of Words Produced in Writing Samples: 1985-1988



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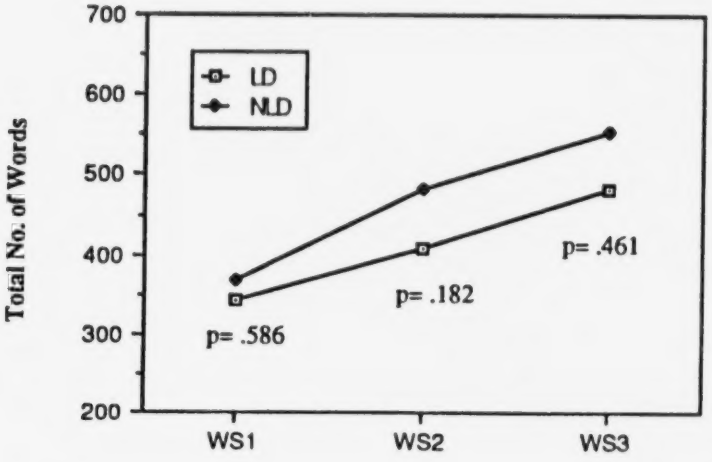

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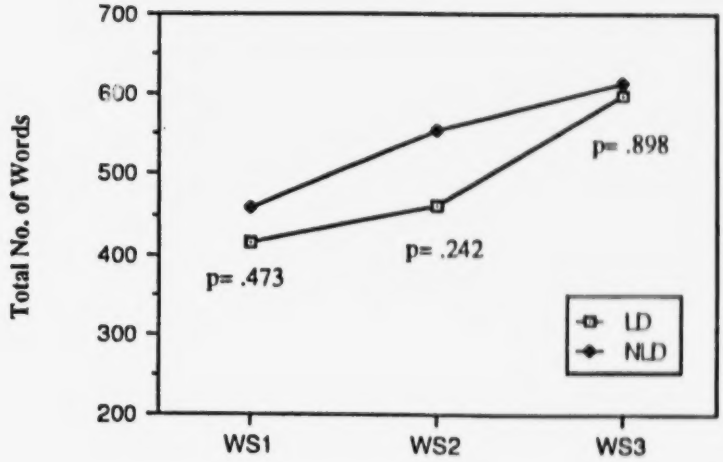

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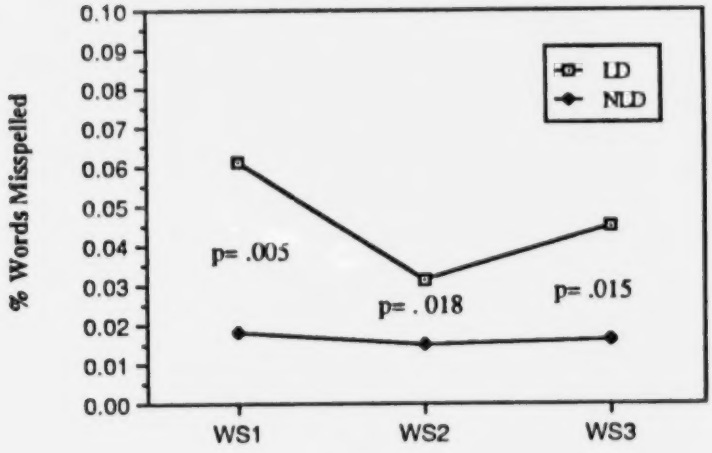
Proportion of Words Misspelled in Writing Samples: 1985-1988



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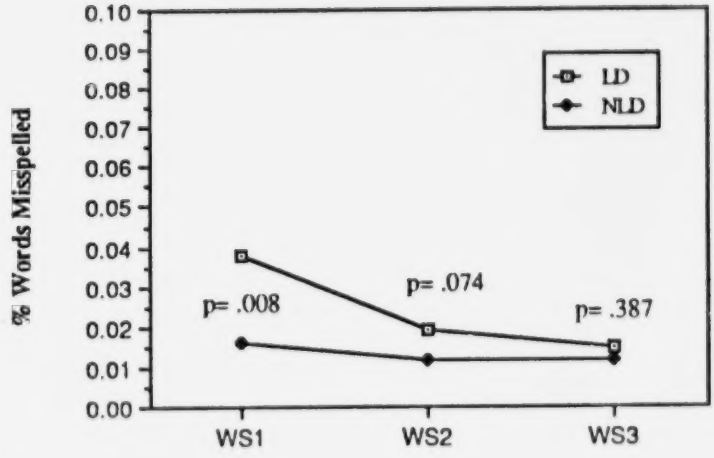

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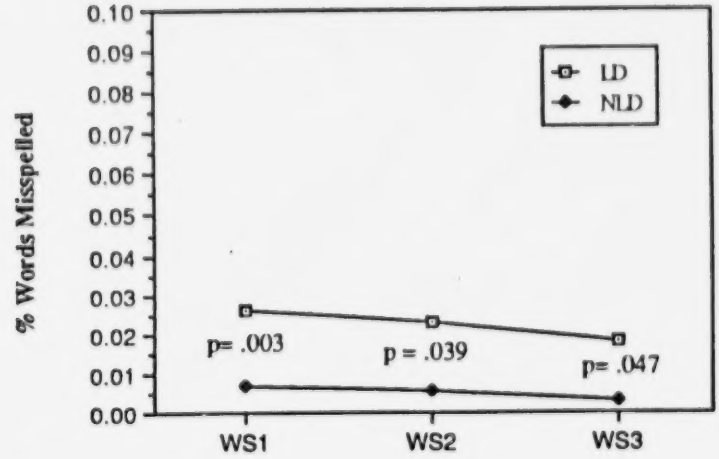

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